DOWN TO EARTH
CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

March 10, 2022
File No. 0250-001.00

Mr. Aaron Sommer
Diamond Point Development
880 Marietta Highway
Suite 630-243
Roswell, GA 30075

Via email: asommer@diamondpointdevelopment.com

Re: Rock Excavation Recommendations and Control Measures
95 Mill Plain Road (U.S. Route 6)
Danbury, Connecticut

Dear Mr. Sommer:

Down To Earth Consulting, LLC (DTE) has prepared the following summary letter describing the proposed commercial development and rock excavation control measures that will be required of the Contractor for the referenced development project at 95 Mill Plain Road in Danbury, Connecticut (Site).

Existing Conditions

The Site consists of approximately 3.4 acres and is located in the City of Danbury. The Site is generally bordered by US Route 6 (Mill Plain Road) to the south, Aunt Hack Road to the west, residential properties to the north, and commercial properties to the east. The Site is currently accessed by Mill Plain Road from the south. Based on historic aerial photos (https://cslib.contentdm.oclc.org/digital/collection), two buildings formerly occupied the Site.

The Site is currently undeveloped, with grades that generally increase in elevation from south to north approximately 70 feet (from El. 470± feet along Mill Plain Road to El. 540± feet at the northern boundary line). Based on a recent Site visit completed by DTE personnel, bedrock outcrops are ubiquitous throughout the northern portion of the Site.

Proposed Development

A preliminary *Grading and Utility Plan* was provided by Benjamin V. Doto, III, P.E., LLC, dated March 1, 2022. Based on this drawing, the proposed development will consist of a three-story, commercial building. The proposed building will be less than 100,000 square feet (sf) overall, with a footprint of approximately 33,000 sf. Paved parking, access-ways, and utilities are proposed immediately surrounding the proposed building.

Based on preliminary site grading, cuts and fills will be necessary. An approximate 35-foot high (maximum) cut is shown along the northern side of the proposed development. Geotechnical borings and engineering will be required to finalize design of the proposed rock slope. Neighboring residential structures are setback about 150 to 200 feet from proposed disturbance limits.

Geologic Mapping

Published surficial and bedrock geological data (1:125,000 scale, *Surficial Materials Map of Connecticut,* Janet Radway Stone et al., 1992 and *Bedrock Geological Map of Connecticut,* John Rodgers, 1985*)* was consulted. Mapping for the Site vicinity indicates that the natural surficial deposits overlying the bedrock are Glacial Till deposits. These thin overburden soils consist of a variable mixture of gravel, sand, silt, and clay that is intermixed with cobbles and boulders.

The underlying bedrock is mapped within the Precambrian Highlands, which consists of fine- to medium-grained, hornblende gneiss and amphibolite. Documented foliations are mapped as striking in a northwest to southeast orientation and dipping to the northeast near vertical (about 85 degrees).

Test Pit Excavations

In order to assess subsurface conditions (particularly depth to bedrock) within the northern portion of the proposed development area, a series of test pit explorations were advanced in accessible Site areas. Shallow test pits were excavated on February 18, 2022, by Earthmovers, Inc. using a CAT 325 excavator. Test pits were excavated to depths of approximately 0.5 to 2 feet below current site grades to refusal on inferred bedrock.

Proposed Rock Excavation

Existing bedrock will require excavation to accommodate the proposed development. Based on the observed nature of existing bedrock outcrops, many of the observed boulders and some weathered rock will be able to be removed with a large excavator. For sound bedrock removal, hydraulic splitters, air rams, or other more aggressive methods may be required. Mass excavation of bedrock by drilling and blasting is anticipated to excavate bedrock (particularly where deeper cut slopes are proposed). Blasting (when required) would consist of drilling a series of holes in a specific pattern, placing a charge and detonator in each hole, detonating the charge, and clearing away the fragmented rock material.

Rock slope faces will require careful presplitting to maintain the integrity of the proposed rock faces, while minimizing potential impacts to surrounding parcels. Quality control procedures will include retention of a qualified blasting contractor, submittal of a detailed blasting plan including an estimation of blasting induced vibrations versus distance, performance of a test blast, and preconstruction surveys of adjacent properties. A rock removal specification was prepared by DTE for the project and is attached for reference.

Additional details regarding the described quality control measures for the project are as follows:

Codes, Permits and Regulations

The retained drilling and blasting Contractor will be required to comply with applicable laws, rules, ordinances, and regulations of the federal government, the State of Connecticut, the City of Danbury, and others having jurisdiction governing the transportation, storage, handling, and use of explosives. This would include applicable Occupational Safety and Health Administration (OSHA), American National Standards Institute (ANSI), National Fire Protection Associations (NFPA), and the U.S. Treasury Department, Bureau of Alcohol, Tobacco and Fire Arms regulations.

The Contractor will obtain a permit from the City of Danbury Fire Marshall and will only perform blasting work during the hours permitted by associated City ordinances. The Contractor will also be required to provide proof of and maintain liability insurance coverage during the project.

Blasting Plan

The Contractor and associated personnel will be required to demonstrate experience specializing in explosives for fragmentation of subsurface rock. The Contractor will be required to submit a Blasting Plan to DTE prior to conducting any blasting related activities. The Blasting Plan will include a complete description of the Contractor's proposed plans and methods and will be reviewed by DTE (and submitted to the City to satisfy permit application requirements) prior to proceeding with any blasting activities.

Pre-blast Condition Surveys

Existing owners of adjacent buildings and structures within a minimum distance of 300 feet from the proposed blasting areas will be advised in writing of the opportunity for a pre-blast survey. If accepted by the property owner(s), a qualified, professional engineer will conduct baseline pre-blast condition surveys of adjacent structures prior to any blasting activities. The survey will consist of written documentation, photographs and video of existing cracks, damage, or other visible existing defects.

Test Blast

As part of DTE's review of the Contractor's plan, DTE will designate a secluded Site test area to which the Contractor will confine his initial drilling and blasting operation. The objective of the test blast is for the Contractor to demonstrate competency of their blasting plan of operation. No additional drilling or blasting will be performed until after DTE's examination of the vibration and overpressure data collected from the test blast.

Blast Monitoring

The Contractor will be required to control the amount of vibration and overpressure generated by blasting to not exceed those specified by regulatory statutes or directives established by State, City, or other authorities. The Contractor will be required to limit peak particle velocities and frequencies at the property line generated by blasting to those recommended in U.S. Bureau of Mines report RI-8507, Nov. 1980. The measured overpressures generated by blasting shall not exceed 130 decibels at the property line.

Blasting will be additionally monitored for vibration and air overpressure by DTE. Monitoring performed by DTE will not relieve the Contractor of his responsibility for vibration and overpressure monitoring but is intended to provide an independent verification check.

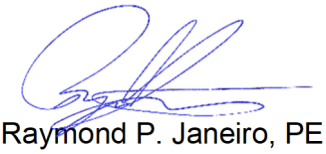
Conclusion

By implementing the described quality controls, rock excavation to support the proposed development would occur in accordance with prevailing standards of care and applicable safety standards.

Please contact the undersigned should you have any questions.

Sincerely,

DOWN TO EARTH CONSULTING, LLC



Raymond P. Janeiro, PE
Principal

Attachments: Rock Removal Specification – 95 Mill Plain Road Development, Danbury, CT

Section 31 23 16.26

ROCK REMOVAL

PART 1 GENERAL

1.01 WORK INCLUDED

A. Removal of rock during excavation.

B. Use of explosives to assist rock removal.

1.02 RELATED WORK

A. Documents:

a. Rock Excavation and Controls Measures (March 5, 2022) for the Proposed 95 Mill Plain Road Development, Danbury, Connecticut by Down To Earth Consulting, LLC.

1.03 APPLICABLE STANDARDS AND PROVISIONS

A. Applicable ordinances, codes, statutes, rules and regulations of the City of Danbury, the State of Connecticut, and others having jurisdiction.

B. Occupational Safety and Health Administration, United States Department of Labor Requirements.

C. ANSI "Safety Requirements for Construction and Demolition."

D. Applicable U.S. Treasury Department, Bureau of Alcohol, Tobacco and Fire Arms regulations.

E. NFPA - Code for the Manufacture, Transportation, Storage, and use of Explosive Materials.

1.04 QUALITY ASSURANCE

A. Seismic Survey Firm: Company specializing in seismic surveys with 3 years documented experience.

B. Explosives Firm: Company specializing in explosives for disintegration of subsurface rock with 3 years documented experience. Personnel will be required to demonstrate experience.

1.05 SUBMITTALS

A. The Contractor shall submit to the Geotechnical Engineer at least two weeks prior to conducting blasting operations a complete description of their proposed plans and methods of blasting prior to proceeding with the work.

B. Indicate proposed methods of blasting, delay pattern, explosive types, type of blasting mat or cover, and intended rock recovery method.

C. Provide diameter, spacing, burden, depth, pattern, and inclination of blast holes.

D. Provide type, strength, amount in terms of weight and cartridges of explosives to be used in each hole, on each delay and the total for the blast.

E. Provide the distribution of the charge in the holes and the priming of each hole.

F. Provide type, sequence and number of delays, delay pattern; wiring diagram for blast; size and type of hookup lines and lead lines; type and capacity of firing source; type, size and location of safety switches, lightning gaps.

G. Provide stemming of holes and matting or covering of blast area.

H. Provide best estimate of gradation of resulting blast rock.

I. Provide projected vibrations versus distance to the property line and adjacent structures.

I. Provide qualifications of the person or persons at the site who will be directly responsible for supervising the loading of the shot and for firing it.

J. Provide written qualifications of seismic survey firm.

K. Provide written qualifications of explosives firm.

L. As part of the Engineer’s review of the Contractor's plan, the Engineer will designate a test area of rock excavation to which the Contractor will confine his initial drilling and blasting operation. No additional drilling or blasting will be performed until the Engineer's examination of the blasting effects has been completed and the original plan of operations reaffirmed or revised in writing, based on the Engineer's review.

1.06 PROJECT RECORD DOCUMENTS

A. Submit two copies of project records and drawings.

B. Complete, maintain and submit permanent blast reports including logs of each blast. Include, as a minimum;

1. Date, exact firing time and limits of blast, by elevation and column location.

2. Name of person in responsible charge; blasting permit number.

3. Unusual joint or seam conditions encountered in the rock.

4. Type and strength of explosives, blasting caps, and distribution of delay periods used.

5. Total explosive loadings per round and per group of delays.

6. On a diagram of the approved test pattern, indicate any holes not drilled, drilled but not loaded, changes in spacing or in pattern of delays or in loading of holes.

7. Prevailing weather conditions, including direction and approximate velocity of wind, atmospheric temperature, relative humidity and cloud conditions at the time of blast.

8. Comments by blaster in charge regarding any misfires, unusual results or effects.

9. An evaluation of the blast indicating tights, areas of significant overbreak and any recommended adjustments for the next blast.

10. Signature and title of person at the site making record entries.

C. Submit summary of complaints.

1.07 COMPLAINTS

A. Report all blasting complaints to the Construction Manager within 24 hours of receipt thereof. Include the name, address, date, time received, date and time of blast complained about, and a brief description of the alleged damages or other circumstances upon which the complaint is predicated. Assign each complaint a number, and number all complaints consecutively in order of receipt.

B. Submit a summary report to the Construction Manager each month which indicates the date, time and name of person investigating the complaint, and the amount of settlement, if any.

C. When settlement of a claim is made, furnish the Construction Manager with a copy of the release of claim by the claimant.

D. Immediately notify the Construction Manager, throughout the statutory period of liability, of any formal claims or demands made by attorneys on behalf of claimants, or of serving of any notice, summons, subpoena, or other legal documents incidental to litigation, and of any out-of-court settlement or court verdict resulting from litigation.

E. Immediately notify the Construction Manager of any investigations, hearings, or orders received from any Governmental agency, board or body claiming to have authority to regulate blasting operations.

1.08 PROJECT CONDITIONS

A. When blasting is found necessary for removal of rock, the Contractor shall take all reasonable precautions for the protection of individuals and property exposed to his operations. Explosives shall be stored, handled and employed in accordance with Federal, State and local regulations.

B. Protect nearby structures from damage. All construction induced damage shall be repaired by the Contractor at no additional expense to the Owner.

C. Perform blasting work only during the hours permitted by ordinances of the City of Danbury, Connecticut.

D. The amount of vibration and overpressure generated by blasting shall not exceed those specified by regulatory statutes or directives establish by State, Town or other authorities. In no case shall the peak particle velocity generated by blasting exceed 2.0 inch per second at 40 Hz as measured at the property line or exceed the recommended values in U.S. Bureau of Mines report RI-8507, Nov. 1980. The measured overpressures generated by blasting shall not exceed 130 decibels at the property line. However, it is the contractor's responsibility to control vibrations and overpressures to whatever lower limits are necessary to protect adjacent properties and persons.

E. Protect new concrete

1. Do not blast within 25 feet of concrete less than 5 days old.

2. Limit peak particle velocity from blasting to less than the following limits:

Elapsed Time After Pouring	Maximum Peak Particle Velocity
0 to 2 Hours	1 inch per second
2 to 24 Hours	0.5 inch per second
24 to 72 Hours	1 inch per second
more than 72 Hours	2 inches per second

1.09 SUBSURFACE DATA

A. Review available boring logs, jar soil samples, rock cores, records of investigation and other pertinent data for the site.

B. Boring logs and respective locations are attached to the referenced Documents in Section 1.02. Jar soil samples and rock cores may be examined upon written request to Down To Earth Consulting, LLC, 122 Church Street, Naugatuck, CT 06770.

C. Aforementioned data are for general information and are accurate only at the particular location and time the subsurface explorations were made. It is the Contractor's responsibility to make interpretations and draw conclusions based on the character of materials to be encountered and the impact on his work based on his expert knowledge of the area and of rock excavation techniques. After obtaining the Owner's permission, the Contractor may take whatever additional borings or explorations he deems necessary, at no expense to the Owner.

D. Note that high torque soil drilling techniques were used to advance boreholes through decomposed and weathered bedrock prior to bedrock coring. At some locations where soil drilling techniques were feasible, drilling and blasting may be required for rock removal.

1.10 UNIT PRICES

A. Notify Construction Manager in writing before blasting proceeds.

B. Rock removal will be measured for payment and shall be included in the lump sum price for earthwork. As a minimum, rock shall be removed as follows:

1. Limits of foundation concrete shown on plans plus 12 inches outside vertical concrete lines and 12 inches below the base.

2. Utility trenches to 6 inches below bottom of pipe and 24 inches wider than pipe diameter.

3. Paved areas to the underside of sub-base.

4. Lawns and planting areas to 24 below finished grade.

C. No payment will be made for overblasted rock left in place.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rock (Definition): Solid mineral material with a volume in excess of 2 cu yd. in open areas and 1 cu yd. in trenches or solid material that cannot be removed with a 3/4 cu yd. capacity power shovel without drilling or blasting.

B. Control Blasting (Definition): Excavation of rock in which various elements of the blast (hole size, depth, spacing, burden, charge size, distribution, delay sequence) are carefully balanced and controlled to provide a distribution of charge that will disintegrate rock to the required contours with as uniform a surface as possible to minimize overbreak and fracturing of rock beyond the contour line.

C. Explosives: Type recommended by explosives firm and required by authorities having jurisdiction.

D. Delay Devices: Type recommended by explosives firm.

E. Blasting Mat Materials: Type recommended by explosives firm

F. Stemming Materials: Type recommended by explosives firm.

PART 3 EXECUTION

3.01 PREPARATION

A. Verify site conditions and note irregularities affecting work of this Section.

B. As a minimum, perform preconstruction surveys of adjoining structures on properties to the site within the zone of influence of the blasting.

C. Obtain appropriate permissions to perform preconstruction surveys.

D. Provide certificate of suitable insurance coverage.

E. Beginning work of this Section means acceptance of existing conditions.

3.02 ROCK REMOVAL - MECHANICAL METHOD

A. Excavate for and remove rock by the mechanical method.

B. Cut away rock at excavation bottom to form level bearing.

C. Remove loose rock to provide sound and unshattered base for foundations.

D. Remove excavated material from site or stockpile for use in other parts of project.

E. Correct unauthorized rock removal by placing compacted granular fill, crushed stoned and/or lean concrete, as directed by the Geotechnical Engineer.

3.03 ROCK REMOVAL - EXPLOSIVES METHOD

A. Advise owners of adjacent buildings or structures in writing prior to setting up seismographs. Describe blasting and seismic operations.

B. Obtain a seismic survey during test blast program prior to rock excavation to characterize vibration transmission characteristics and to determine maximum charges that can be used at different locations in area of excavation without damaging adjacent properties.

C. Provide seismographic monitoring during progress of blasting operations at two 2 locations minimum. As a minimum, each blast shall be monitored as follows:

1. Vibrations shall be monitored at the property line nearest to the blasting area, and on the ground surface adjacent to the nearest structure. When so directed by the Geotechnical Engineer, vibrations shall also be monitored adjacent to freshly placed concrete.
2. Overpressures and vibrations shall be monitored along the property line as directed by the Geotechnical Engineer.
3. The Contractor shall verbally report vibration/overpressure monitoring results to the Geotechnical Engineer within two hours of blasting and shall provide written reports of monitoring results to the Owner, Construction Manager and Geotechnical Engineer within 24 hours of blasting.

D. Use controlled blasting techniques to reduce overbreak to a minimum and keep vibrations and noise within specified limits.

E. Disintegrate rock and remove from excavation.

F. Cut away rock at excavation bottom to form level bearing.

G. Remove shattered layers to provide sound and unshattered base for foundations.

H. Remove excavated material from site or stockpile for use in other parts of project.

I. Correct unauthorized rock removal by placing compacted granular fill, crushed stone and/or lean concrete, as directed by the Geotechnical Engineer at no cost to owner.

3.04 FIELD QUALITY CONTROL

A. Provide for the Geotechnical Engineer visual inspection of bearing surfaces and cavities formed by removed rock.

B. Blasting may be additionally monitored for vibration and/or air overpressure by the Geotechnical Engineer. Monitoring performed by the Geotechnical Engineer does not relieve the Contractor of his responsibility for vibration and overpressure monitoring.

C. Coordinate all blasts with the Construction Manager and the Geotechnical Engineer.

D. When vibrations or noise exceed specified limits, reduce size of loads, use additional millisecond delays, or take other appropriate measures as necessary to satisfy vibration and overpressure requirements.

END OF SECTION